issued, in directing attention to this development, states that at the end of 1902 the staff numbered twenty-six, with one superintendent, in addition to the director. In July, 1914, the number had increased to 187. At the present time the staff numbers 532, with six superintendents (including the secretary) and nineteen principal or senior assistants. Nearly fifty members of the staff are on military service, and four have sacrificed their lives in the cause of right. The staff remaining is almost exclusively engaged on war work, including researches of a confidential character as to which but little can be written.

The increasing dependence of the country on applied science, for both war and commerce, has been emphasised by recent events, and as a natural corollary the laboratory, with some other institutions, has become nationalised. The property of the laboratory has been vested in the Imperial Trust for the Encouragement of Scientific and Industrial Research. This transference includes the William Froude National Tank, from which results of great value to the Admiralty have been obtained.

During the past year there has again been a considerable increase in the work of the laboratory. In particular, the laboratory has been asked by the Ministry of Munitions to undertake the manufacture of a certain class of gauges and to extend largely the provision for the testing of glass vessels for chemical work. For these two objects new buildings are required and are being provided. The number of munition gauges passing through the laboratory for testing purposes has approached 10,000 a week. In the Aerodynamics Department the demands grow daily, and the laboratory has been required by the Air Ministry to extend the accommodation, especially by the provision of additional large air channels.

It is only possible to refer briefly to one or two points of special interest in connection with the work of other departments. It is proposed that the custody and maintenance of the primary electrical standards of the Electrical Standards Laboratory of the Board of Trade should be assigned to the National Physical Laboratory, so as to avoid the continuance of dual systems of standards. Since the early part of 1917, when the supply of clinical thermometers was taken over by the Ministry of Munitions, it has been found desirable that each individual thermometer should undergo test, and more than 3000 clinicals have been tested per week. This work has necessitated the provision of three new clinical test baths, the capacity of each bath being approximately 600 instruments per normal day. Two new pantagraphs of simplified design have been constructed for the marking of satisfactory instruments. A card index record is made of all thermometers passing through the department. In the optics division, in addition to the large amount of routine testing carried out on behalf of the Ministry of Munitions, valuable work has been done in testing the refractive properties of optical glass and in simplifying the methods employed in the calculation and design of optical systems. The record of the laboratory affords overwhelming proof of the national importance of both pure and applied physics, and this must inevitably lead to more adequate recognition of the professional status of the physicist.

NOTES.

IN June last the Board of Trade, in co-operation with the Ministry of Reconstruction, appointed a Committee "to examine and report upon the water-power resources of the United Kingdom and the extent to which they can be made available for industrial purposes." The announcement met with a cordial reception, for, with the exception of power installations at Kinlochleven, in the Scottish Highlands, and Dolgarrog, in North Wales, both for aluminium works, there is practically no utilisation on any appreciable scale of the natural water resources of the country, and the scope for development seems considerable. The names of the Committee commanded confidence. Sir John Snell is chairman, and, on the technical side, Sir Dugald Clerk, Mr. A. Newlands, and Mr. Philip Dawson are members; representatives of the Government and of the Associated Chambers of Commerce are also included. In the course of its investigations this Committee, which is still sitting, has found it desirable to delegate to a sub-committee its functions in so far as Ireland is concerned. Such a sub-committee has just been appointed by the Board of Trade, and it comprises Sir J. Purser Griffith (chairman), Dr. J F. Crowley (vice-chairman), Mr. T. M. Batchen, Mr. G. Fletcher, Mr. L. J. Kettle, Lord Leitrim, and Mr. J. C. White, with Prof. H. H. Jeffcott as secretary. Although Ireland is not endowed to the same degree with favourable conditions such as those of the Highlands of Scotland, there are latent resources of water-power which are roughly computed by Mr. Newlands at between 200,000 h.p. and 350,000 h.p. These are to be found in connection with the great rivers which have a very considerable fall almost at the points at which they enter the sea. The reports of both Committees will be awaited with interest.

WHEN the British Scientific Products Exhibition was held by the British Science Guild at King's College, London, last summer, the hope was expressed that it would be transferred to great industrial centres in the provinces. Manchester promptly took steps to act upon this suggestion, and announcement can now be made that the exhibition will be opened at the College of Technology on December 27, and will remain open for a fortnight. The Right Hon. the Lord Mayor of Manchester is the chairman of the committee, and the detailed arrangements are in the hands of a strong executive committee of which the principal of the college is chairman. The exhibition will follow the lines of that organised by the British Science Guild, but it will naturally be stronger in certain sections which represent industries centred in Manchester; in particular, the display of dyes and textiles is expected to afford a striking example of what British science and industry have been able to achieve in spite of war conditions, under the stimulus of the knowledge and enthusiasm of our scientific workers and manufacturers. Official exhibits will include a very striking collection of materials, models, and instruments used by and relating to the aircraft industry, which is being shown by the Aeronautical Inspection Department. The National Physical Laboratory, the Admiralty, and the Meteorological Office are also contributing departmental exhibits of high interest, and the Gas Traction Committee will show much the same collection which raised such interest at King's College. The other sections comprise heavy and fine chemicals, including drugs, food products, metallurgical products, glassware, and electrical, optical, thermal, mechanical, and surgical appliances. There will also be a representative exhibit of British natural products which have been exploited since 1914.

A WRITER in the *Times*, directing attention to the fact that a large number of Royal Air Force officers will shortly be demobilised, suggests that they might profitably be employed in making an aerial photographic survey of the British Isles. He believes that this would prove useful to surveyors, architects, engineers, and others. While fully endorsing this writer's opinion that it would be unfortunate to lose the expert services of these flying officers, many of whom are better trained than any future airmen can hope to be, we cannot agree that a series of aerial photographs could be of great service to surveyors and engineers. Such photographs show the landscape from a new point of view, but they naturally lack the accuracy of carefully drawn topographical maps. On the other hand, such a survey might be of considerable value in the progress of flying for commercial and other purposes. Many attempts have been made to devise suitable maps for airmen, but even the best available leave much room for improvement. A series of photographs, or, better still, several series taken under varying atmospheric conditions, would be of great help to the cartographer in constructing the type of map of use in flying. A number of experienced officers and men might well find employment in this work.

DR. R. T. LEIPER's investigations on Bilharziosis in Egypt and China, and those of various Japanese zoologists in Japan, have demonstrated the practical importance of the fresh-water molluscs as possible carriers of human disease. No indigenous species of Schistosomum, the Trematode parasite of Bilharziosis, is known to be commonly found in man in India, though sporadic cases of apparently autochthonous infection have been reported. The medical and sanitary authorities have, however, been prompt to recognise the danger of the introduction of *Schistosomum haematobium* into the country by means of infected persons returning from the front in Egypt or Mesopotamia. The Government of India has, therefore, instructed the newly constituted Zoological Survey of India to devote its attention to a survey of the fresh-water molluscs and their Trematode parasites. Dr. N. Annandale, the director, is studying the taxonomy, variation, and geographical distribution of the molluscs, and has commenced a series of tours to different parts of India proper and on the North-West Frontier, while Mr. S. W. Kemp is investigating the anatomy of the Cercariæ that infect the different species of water-snails and the possibility of infecting the latter with miracidia from the eggs of *Schistosomum haematobium*. Dr. F. H. Gravely is studying the life-histories of the molluscs, while Dr. Baini Prashad, formerly Superintendent of Fisheries, Bengal, has been appointed scientific assistant for the purpose of the whole inquiry. A generous grant of money has been made by the Indian Research Fund Association, and it has been arranged that the Zoological Survey shall work in the closest co-operation with the Indian Medical Service.

THE establishment of the Czech Republic, implying the severance of Bohemia and her neighbours, Moravia and Austrian Silesia, from the late Austrian Empire, has brought into prominence a race with remarkable gifts. Among men of science belonging to the Czech nation are the physiologist J. E. Purkyne, and a better-known name in England, the chemist Prof. Bohuslav Brauner, D.Sc. of Manchester. President Thomas G. Masaryk, lately in London, and now on his way to take up his duties at Prague, has long been known as a critical student of the English philosophers Hume, John Stuart Mill, and Spencer, besides Kant and Comte. Born in 1850, the son of Slovak parents, in Silesia, he began life as a blacksmith, but was soon able to cultivate his special gifts at Vienna and Leipzig. When the Czech University of Prague was opened in 1882 Masaryk was appointed professor of philosophy. From students we know that the standard required by him as an examiner is very high. Numbers of young men from Serbia and other Slav countries have passed under his influence. Prof. Masaryk's career has been that of a man of letters and politician rather than of a man of science, but as a sociologist he has written on suicide as a feature of modern European life, and on other social questions. A fearless investigator, Prof. Masaryk demonstrated that certain manuscripts purporting to be ancient Czech patriotic poems lately discovered, which were highly treasured and had found enthusiastic translators in many countries, were no more than adroit forgeries. In the notorious Friedjung trial of 1909 Prof. Masaryk conclusively proved that forged documents were made use of by the Austro-Hungarian Foreign Office. In December, 1914, he contrived to escape from Bohemia, where, like many of his colleagues, he must inevitably have suffered imprisonment, and has since championed the cause of Bohemian independence. Prof. Masaryk has lectured on Slav literature and sociology at King's College in connection with the School of Slavonic Studies. His inaugural lecture was on the problem of small nations in Europe. Both as writer and speaker President Masaryk is a thorough master of English.

INFLUENZA shows a further decrease in the number of deaths in London, the Registrar-General's return giving 942 for the week ending November 30. This brings the total deaths in London to 10,383 in the eight weeks of the epidemic. The deaths are still greatest at the ages of twenty to forty-five. Influenza has occasioned only 37 per cent. of the deaths from all causes in the week ending November 30, which is a lower rate than any previous week since that ending October 19, the percentage in the five weeks ending November 23 being respectively 47, 57, 57, 49, and 42. The epidemic is still very virulent in many country districts, and the returns for the ninety-six great towns of England and Wales, including London, show a slight increase in the number of deaths, many of the largest towns being less fortunate than London in this respect.

IN London the aggregate rainfall for the three months September, October, and November, which constitute the autumn, was, according to the Greenwich observations, 1·3 in. more than the normal. The excess was entirely due to the very wet September, when the rain measurement was 4·48 in. October had a deficiency of 1·2 in., and November a deficiency of 0·2 in. Rain was measured in London on twenty-five days in September, twenty-two days in October, and twenty-two days in November. The atmosphere throughout the autumn was generally humid, and the wind was drawn very greatly from the Atlantic. According to the monthly weather report for September, issued by the Meteorological Office, the weather was abnormally wet over the British Isles generally. In the West Riding of Yorkshire and in Lincolnshire, where the records extend over a period of more than fifty years, it was not only the wettest September, but wetter than any calendar month of the year. In many places rain fell every day. At Greenwich the mean temperature for each of the autumn months differs only a few tenths of a degree from the normal. The mean of the maximum and minimum temperatures for September was 57°, October 50°, and November 43°. In September the thermometer ranged from 73° to 38°, October 64° to 31°, and November 59° to 29° September had six days with the thermometer above 70°, October seven days above 60°, and November thirteen days above 50°. There were seven nights in November with the lowest temperature above the monthly mean temperature for the twenty-four hours; two of these occurred in the closing week. The monthly weather report shows that September was generally cold over the whole country, and the temperatures on September 29 and 30 were in many places lower than any previously recorded in September. At Greenwich the duration of bright sunshine for the three autumn months was about six hours more than the normal, the sun registering for 162 hours in September, 78 in October, and 69 in November.

THE American Ornithologists' Union has elected Dr. Walter E. Collinge, of St. Andrews University, a corresponding fellow of the society in recognition of his investigations on economic ornithology.

PROVIDED an essay deemed worthy by the committee of award be received, the College of Physicians of Philadelphia will, on July 14 next, award the Alvarenga prize, value about 50*l.*, for a paper not previously published upon any subject in medicine. Competing essays must reach the secretary of the college, Mr. F. R. Packard, 19 South 22nd Street, Philadelphia, on or before May 1, 1919.

THE death is announced, in his seventy-first year, of Prof. Pierre de Peyster Ricketts, professor of assaying at Columbia University, New York, from 1885 to 1893, and from 1893 to 1900 professor of analytical chemistry and assaying. Since his retirement from the University Prof. Ricketts had been the head of a firm of mineralogical consulting engineers. In 1876 he published "Notes on Assaying," the first book on the subject to be adopted as a text-book throughout the colleges of the United States.

WE regret to note that the death of Mr. Frederick Edwards is recorded in *Engineering* for December 6. Mr. Edwards was born in 1848, and his death occurred on November 27. His name is well known in engineering circles as the inventor of the air-pump bearing his name. Hundreds of engineers have designed air-pumps since the days of Watt, yet that invented by Mr. Edwards marked a great advance on all that preceded it, and this result was attained by a simplification of parts which left men wondering why it had not been effected years before. Mr. Edwards, after varied experience, commenced practising as a consulting engineer in 1871, and continued to do so down to the time of his death. He was a member of the Institutions of Civil Engineers, Naval Architects, and Mechanical Engineers.

THE death of Mr. R. J. Pocock from influenza and pneumonia at Hyderabad Observatory on October 9 removes a most promising and energetic astronomer at the age of twenty-nine years. Born at Harlesden, London, on January 23, 1889, Mr. Pocock at an early age showed keen interest in scientific subjects, especially in astronomy, his mental faculties being encouraged and stimulated by his father. At the age of nine he went to Christ's Hospital, West Horsham, leaving there in 1908 with a scholarship at Queen's College, Oxford, where he greatly enhanced his mathematical reputation, obtaining First Classes in the mathematical school in 1909 and 1912. He then gave a year's work at the University Observatory for the B.Sc. research degree, and in the same year became the senior mathematical scholar. Evidently being marked out for an astronomical career, Mr. Pocock was appointed the director of the Nizamiah Observatory in 1914, with the definite object of assisting the Santiago (Chile) Observatory in completing the zone −17° to −23° for the International Survey. This involved the taking of 720 good negatives in −17° to −20°, and the consequent measurement and necessary reductions. At Mr. Pocock's death two of the zones (360 plates) had been finished and the results printed; the other plates had been so far completed that only 100 regions remained to be photographed and measured. This satisfactory result was the outcome of his own keen and energetic work, which instilled similar qualities in the Indian assistants. In addition to this somewhat tedious and absorbing work Mr. Pocock found time, in five years, to contribute fifteen papers to the Royal Astronomical Society (of which he was elected a fellow in 1914), four of which were read at the November meeting—a month after his death.

MR. E. A. MARTIN, president of the Croydon Natural History Society, has reprinted an interesting lecture on Anglo-Saxon remains in that neighbourhood. The earliest of these are a series of graves with cremated bodies found near Mitcham and Hackbridge. Near Mitcham have been found cases in which it is assumed that widows were immolated with their dead husbands. Interments in tumuli on Farthing Downs have provided some interesting artifacts. Near Thornton Heath railway station a stone coffin with a hoard of coins was unearthed. The local museum contains a fine collection of Saxon remains found at Croydon in 1894. Saxon occupation of the district is illustrated by a number of local place-names.

IN the *Scientific Monthly* (vol. vii., No. 5, November, 1918) W. La Rue discusses the problem of testing for intelligence, with special reference to the Army. The intelligence test is no longer of merely academic significance with the object of classification; it is not a museum arrangement of individuals that is the goal, but it is really necessary for practical purposes, since we are often now in the position of requiring to know what people will or can do in a given situation. The criterion of a test and of a tester is the possibility of predicting from the subject's behaviour with regard to the test how he will behave with regard to other problems. Just as we can prove a machine by testing its various parts, so may we test for intelligence. The alternatives are not laboratory tests *versus* no tests, but laboratory tests as against the casual test of individual opinion, which has many times been found to be fallible. In order that we may get more definite results, we ought to test, not only for general intelligence, but for special situations as well. The author maintains that the results of recent work done on these lines in the American Army are very promising. Although intelligence is not the only factor desirable in a soldier, line officers rating more highly obedience, adaptability, and dependability, yet from experiments it is found that if a man is placed according to his intelligence, he will be found to be placed substantially according to his camp value. The author believes that wherever there are problems of mental classification and of assignment to a person of the most suitable occupation, there the psychometrist will be of service.

MAMMALOGISTS will welcome the description of the mammals from the Korinchi country, West Sumatra, by Messrs. H. C. Robinson and C. Boden Kloss, which appears in the Journal of the Federated Malay States Museums (vol. viii., part 2, 1918), not only because it deals with the most extensive collection yet made in the island proper, but also because of the very careful way in which the work has been done. Six species are described for the first time, while a number of others, of which temporary diagnoses have already appeared, are now described in detail. Adults and young and variations attributable to age, sex, and season or to individuals are all carefully described, as also are differences attributable to altitude.

A DELIGHTFUL essay on the gannets of Bonaventure Island by Mr. P. A. Taverner appears in the *Ottawa Naturalist* (vol. xxxii., No. 2). Mr. Taverner describes the breeding colonies, not only of the gannets, but also of the guillemots, puffins, and petrels associated therewith. An attempt, he remarks, has been made to make this spot a perpetual bird reserve, but the efforts of the Conservation Commission in this direction have met with only a cold response from the local population. It is to be hoped that the Dominion authorities will not relax their efforts in this matter, if only to put an end to the wanton destruction caused by "sportsmen" who seem to take a delight in slaughtering the birds without making any use whatever of their victims, which include thousands of young left to die of starvation by the death of their parents.

THE peach-shoot borer (*Laspeyresia molesta*, Busck.) causes considerable damage to peach-trees, as well as to other rosaceous trees, in Japan. An interesting account of the biology of this insect is given by Messrs. Harukawa and Yagi in the *Berichte des Ohara Institutes* (Bd. i., Heft 2, pp. 151–70). On the south coast of western Japan this insect passes through five generations in a single year, but the number of annual generations appears to be determined to a greater or less extent by the climatic conditions. The duration of the egg stage was found to be 2–4 days, of the larval condition 11–15 days, whilst the insect remained in the pupal state for 6–10 days. At the onset of cold weather the larvæ spin their cocoons, pass the winter as caterpillars, and only assume the pupal state the following spring. The young caterpillar, as soon as it leaves the egg, makes its way to the base of a still unexpanded leaf of a young shoot of the peach-tree, bores its way into the pith, and destroys this from above downwards. The insect also attacks the fruit of the peach, pear, etc.

RADIO-METALLOGRAPHY is the subject of a short article by Mr. Thorne Baker in the *British Journal of Photography* for November 29. By using a modern high-tension transformer and Coolidge tube, heavy currents of extreme penetrating power can be produced, and render it possible to take photographs through 4 in. of hard steel. A hole 1/64th of an inch in diameter and of the same depth, drilled in the upper surface of a block of steel 2 in. thick, will show distinctly in a good radiograph with an exposure of about two minutes, so that the usefulness of the method for showing flaws and cavities is very promising. Installations for testing by this method have been put up by many large engineering firms. The protection of the operator is a rather different problem from that in ordinary medical work, and it is preferable to control the apparatus from a separate room or cabin, the partition being lined with heavy sheet-lead, a thick lead-glass window being provided, and covered with a lead shutter immediately the tube is seen to be acting properly.

THE subject of the Traill-Taylor lecture, which was delivered this year by Mr. F. Twyman, of Messrs. Adam Hilger, Ltd., was "The Use of the Interferometer for Testing Optical Systems." A full account of the lecture is published in the Journal of the Royal Photographic Society just published (November). Mr. Twyman's experience confirms Lord Rayleigh's rule (which was derived from the calculations of light intensity distribution for a few specific cases) that an optical instrument cannot properly be described as of first quality if it produces aberrations greater than a quarter of a wave-length. Many photographs of interference patterns produced by aberrations are given in the report. In order to utilise the result of the test, the contour lines of the pattern are marked during the observation on the surface of the lens with a paint-brush, and then the part indicated as the highest is polished off, gradually extending the area of polishing to the further contour lines. Mr. Twyman says that this is "not at all a difficult or very lengthy operation, and one which I have performed this morning, before my usual breakfast-hour, on a very similar lens." We are therefore justified in hoping that the near future will enable us to get optical systems much nearer to perfection than those to which we have been accustomed, without any notable increase in their cost.

THE importance of kinematograph propaganda has been fully realised by America and Germany, and it is quite time that its usefulness was appreciated in England. As the Industrial Publicity Service, Ltd. (Hampden House, Kingsway, W.C.2), points out in a recent brochure, 90 per cent. of the films shown to the British public are of foreign origin, with the result that the conceptions of life which a multitude of our people derive are those as represented principally in America. Among the objects of the Industrial Publicity Service (which is a non-profit organisation controlled by various manufacturers' associations) are that it should serve as a medium by which the general public at home and abroad should be better informed of the development of British industries through the Press, and that it should organise kinematograph displays, etc., showing the importance of improved methods of production on the well-being of the population. In this respect the claims of British science as applied to industry should receive attention, so that other nations may realise, through the medium of the kinema, what Britain has accomplished in that direction. If this method of propaganda were judiciously resorted to, it would go far to maintain the prestige of the British nation among our Allies and neutral countries. The main thing is to make films of this kind popular and interesting, and it could be done without detracting in any way from the dignity of science.

IT is well known that American shipbuilding yards have made extensive use of bridge-building and other suitably equipped works for the fabrication of parts of vessels Similarly it was necessary to utilise for the propulsion of ships so built every type of standard engine which could be said to be in any way suitable for marine work. From an article in *Engineering* for November 29 we learn that American ships are being equipped with almost every known type of oil-engine, utilising in consequence in the case of several types various means to reconcile conditions of maximum propeller and engine efficiency, such as mechanical gearing and electric transmission. The powers so far are relatively small, 200 h.p. per cylinder being the maximum recorded. In one case the main Diesel engines are of the Willans and Robinson type, with six working cylinders 12 in. by 18 in., and develop 320 b.h.p. at 250 revs. per minute. This speed is reduced by gearing to 100 revs. per minute at the propeller. This method has a number of advantages in the application of Diesel engines to marine propulsion. The problem is not quite analogous to mechanically geared turbines, and the question of the ability of mechanical gearing to stand up to its work under conditions of uneven turning moments is the principal one that can be raised in connection with this application of gearing.

THE latest catalogue (No. 176) of Messrs. W. Heffer and Sons, Ltd., Cambridge, gives particulars of upwards of 1300 works dealing with a variety of subjects. Many of the books offered for sale are first editions, and not easily obtainable. The section devoted to science and mathematics is not lengthy, but the catalogue is worthy of the attention of readers of NATURE because of it and that headed "Books for Librarians." In the former section we notice long runs of *Biometrika*, the British Association Reports, the *Conchologist*, the *Philosophical Magazine*, vols. i. to xcii. of NATURE, and complete sets of the Proceedings of the Physical Society of London and the Proceedings of the Royal Society of Medicine. In the section of "Books for Librarians" are to be found a complete set, to 1914, of the *Journal of Physiology* and long series of the Journal of the British Astronomical Association, Memoirs of the Royal Astronomical Society, the Journal of the Royal Geographical Society, the *Geological Magazine*, the Journal of the Royal Microscopical Society, and the Proceedings and Transactions of the Zoological Society of London. The catalogue will be sent free upon application.

THE next volume to be published in *Messrs. Constable and Co.'s* "Staple Trades and Industries" series will be "Tea," by D. Hunter. Other volumes are in preparation. *Messrs. Henry Frowde and Hodder and Stoughton* announce "War Neuroses and Shell Shock," Lt.-Col. F. W. Mott, illustrated; "Orthopædic Effects of Gunshot Wounds and their Treatment," Capt. S. W. Daw; "Medical and Surgical Aspects of Aviation," H. Graeme Anderson; "The Anatomy of the Peripheral Nerves," Lt.-Col. A. M. Paterson; and "The Early Treatment of War Wounds," Col. H. M. W. Gray. *Messrs. Heinemann (Medical Books), Ltd.*, will publish shortly "Pensions and the Principles of their Evaluation," Drs. Ll. J. Llewellyn and A. Bassett Jones. *Messrs. Longmans and Co.'s* new list includes "Naval Architects' Data," J. Mitchell, edited by E. L. Attwood; vols. ii. and iii. of "A System of Physical Chemistry," Prof. W. C. McC. Lewis; vol. i. of the third edition of "British Birds," written and illustrated by A. Thorburn; and new editions of "Recent Advances in Organic Chemistry," Dr. A. W. Stewart, and "Dental Surgery and Pathology," J. F. Colyer. *Messrs. Witherby and Co.* announce the publication, in serial form, of "De Vogels van Nederland," by Dr. E. D. van Oort. The work will be issued in forty parts, and contain four hundred coloured plates. It will be written in the Dutch language, with the scientific names given, in addition, in English, French, and German.

OUR ASTRONOMICAL COLUMN.

DWARF STARS.—In the course of an article which appears in the November issue of *Scientia*, Dr. A. C. D. Crommelin discusses the evidence which suggests that dwarf stars are the most numerous class of stars in space. Such stars, which are to be regarded as small in volume rather than in mass, may comprise about three-fourths of the total number of stars, but only a few of them are known, because at a very moderate distance they become too faint to be included in our star catalogues. As examples of dwarf stars, Barnard's runaway star in Ophiuchus and the "Proxima Centauri" of Innes are described in detail. Barnard's star has a proper motion of 10·3″ per annum and a parallax of 0·525″, and is unique as being the only star having a proper motion which is sensibly increasing as a result of diminishing distance. The velocity of approach is about 100 km. per second, and this would cause the annual proper motion to increase by 0·10″ per century, which is in satisfactory agreement with the available observations. The spectral type of the star is M*b*, and its luminosity 1/2000 that of the sun. From its high speed a small mass is probable, and if the star be assumed to have a mass one-eighth that of the sun, and a somewhat greater density, the surface brightness would be 1/170 that of the sun.

THE SUN'S ROTATION.—The application of the spectroscopic method to the investigation of the sun's rotation has led to such different results as to have suggested to several observers that the rate of rotation must be variable. Mr. R. E. De Lury, however, has maintained for some time that the differences in the results are not of solar origin, but arise from varying amounts of atmospheric haze, which superposes an unmodified solar spectrum on the displaced spectra at the solar limbs. He returns to the subject in a further discussion of the observations made at Ottawa (*Astrophys. Journ.*, vol. xlviii., p. 195), and concludes that there is at present no sound reason for believing that the rate of the sun's rotation is variable. In general, high values of the rotation were obtained during brighter conditions, and low values during hazier conditions. Thus the low values of rotation obtained by Evershed and Royds in 1912–13 may well have been due to the haziness produced by the Katmai eruption in June, 1912, which also caused a great reduction in the measured values of the solar radiation.

THE CANADIAN 72-IN. REFLECTING TELESCOPE.—The great reflecting telescope which has been erected by the Canadian Government on Observatory Hill, near Victoria, B.C., has been finally completed by the installation of the optical parts, and is now in regular successful operation. Further interesting details of the instrument are given by the director, Dr. J. S. Plaskett, in a communication to the Journal of the Royal Astronomical Society of Canada (vol. xii., p. 399). The disc of glass, 73½ in. in diameter, about 13 in. thick, with a central hole 6 in. in diameter, and weighing nearly 5000 lb., was successfully cast and annealed at the works of the St. Gobain Glass Co., in Charleroi, Belgium. It was completed in July, 1914, and was fortunately shipped from Antwerp about a week before the declaration of war. The grinding and figuring of the mirror to a focal length of 30 ft. was carried out by the Brashear Co., at Pittsburgh. The maximum deviation of the final curve from theoretical perfection amounted only to about one-eighth of a wave-length, or double the accuracy required by the specifications. The secondary mirror